at1121exam_practice: Radicals and Squares (v608)

Question 1

Simplify the radical expressions.

$$\sqrt{63} \qquad\qquad \sqrt{98} \qquad\qquad \sqrt{27}$$

$$\sqrt{3 \cdot 3 \cdot 7} \qquad\qquad \sqrt{7 \cdot 7 \cdot 2} \qquad\qquad \sqrt{3 \cdot 3 \cdot 3}$$
$$3\sqrt{7} \qquad\qquad 7\sqrt{2} \qquad\qquad 3\sqrt{3}$$

Question 2

Find all solutions to the equation below:

$$3\left((x - 10)^2 + 8\right) \;=\; 72$$

First, divide both sides by 3.
$$(x - 10)^2 + 8 = 24$$

Then, subtract 8 from both sides.
$$(x - 10)^2 = 16$$

Undo the squaring. Remember the plus-minus symbol.

$$x - 10 = \pm 4$$

Add 10 to both sides.
$$x = 10 \pm 4$$

So the two solutions are $x = 14$ and $x = 6$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 - 14x = -40$$

$$x^2 - 14x + 49 = -40 + 49$$
$$x^2 - 14x + 49 = 9$$
$$(x - 7)^2 = 9$$
$$x - 7 = \pm 3$$
$$x = 7 \pm 3$$
$$x = 10 \qquad \text{or} \qquad x = 4$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y = 5x^2 - 40x + 77$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 5 .
$$y = 5(x^2 - 8x) + 77$$

We want a perfect square. Halve -8 and square the result to get 16 . Add and subtract that value inside the parentheses.
$$y = 5(x^2 - 8x + 16 - 16) + 77$$

Factor the perfect-square trinomial.
$$y = 5((x - 4)^2 - 16) + 77$$

Distribute the 5.
$$y = 5(x - 4)^2 - 80 + 77$$

Combine the constants to get **vertex form**:

$$y = 5(x - 4)^2 - 3$$

The vertex is at point $(4, -3)$.